Social Network Analysis

SNA Week 1

Assignment submitted on 2025-07-22, 14:57 IST

1) Social network analysis can be applied in which of the following domains? ***1 point***

- Healthcare
- Cyberspace
- Marketing
- All of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
All of the above

2) In an ego-centric network, the central node and its neighbours, respectively, are referred to as ***1 point***

- Alter and ego nodes
- Ego and Alter nodes
- Central and Degree nodes
- Cluster centroid and cluster nodes

Yes, the answer is correct.
Score: 1
Accepted Answers:
Ego and Alter nodes

3) What is the space complexity of the adjacency matrix for a graph with V vertices and E edges? ***1 point***

- O(E + V)
- O(EV)
- $O(V^2)$
- $O(E^2)$

Yes, the answer is correct.
Score: 1
Accepted Answers:
$O(V^2)$

4) The time complexity to check if an edge exists between two nodes using an adjacency list is: ***1 point***

- O(degree of node)
- $O(V^2)$
- O(1)
- O(V)

Yes, the answer is correct.
Score: 1
Accepted Answers:
O(degree of node)

5) How many edges are there in an undirected complete graph with 10 nodes? ***1 point***

- 90.0
- 20.0
- 45.0
- 30.0

Yes, the answer is correct.
Score: 1
Accepted Answers:
45.0

6) In a complete bipartite graph $K_{m,n}$, the number of edges is: ***1 point***

- m + n
- m × n
- m^n
- m(n-1)/2

Yes, the answer is correct.
Score: 1
Accepted Answers:
m × n

7) The adjacency matrix of an undirected graph is always: *1 point*

- Asymmetric
- Upper triangular
- Lower triangular
- Symmetric

Yes, the answer is correct.
Score: 1
Accepted Answers:
Symmetric

8) In a hypergraph, an edge can: *1 point*

- Connect exactly two vertices
- Connect only adjacent vertices
- Connect any number of vertices
- Connect only directed edges

Yes, the answer is correct.
Score: 1
Accepted Answers:
Connect any number of vertices

9) Which of the following is not a link-centric view of the network? *1 point*

- Unipartite
- Bipartite
- Signed
- Ego-network

Yes, the answer is correct.
Score: 1
Accepted Answers:
Ego-network

10) Which of the following is not a standard level of network analysis? *1 point*

- Microscopic
- Mesoscopic
- Macroscopic
- Megascopic

Yes, the answer is correct.
Score: 1
Accepted Answers:
Megascopic

SNA Week 2

Assignment submitted on 2025-08-03, 11:40 IST

1) In a linearly connected (chain) undirected graph with N nodes, the average degree is given as 1.6. Using the relation = 2E/N, compute the number of nodes N. ***0 points***

- 5
- 10
- 8
- 12

No, the answer is incorrect.
Score: 0
Accepted Answers:
8

2) In a circular network with N nodes, if every node is connected to two neighbors, and an additional diagonal edge is added between alternate nodes, what is the new average degree? ***0 points***

- 2
- 2.5
- 3
- 1.5

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.5

3) In a weighted social graph, which centrality measure is best suited to detect weakly connected yet highly influential nodes that serve as bridges between dense communities? ***1 point***

- Closeness Centrality
- Betweenness Centrality
- Eigenvector Centrality
- PageRank

Yes, the answer is correct.
Score: 1
Accepted Answers:
Betweenness Centrality

4) Katz centrality extends eigenvector centrality by accounting for ***1 point***

- Degree distribution of neighbors
- Path length attenuation
- Node weight
- Triangle closure

Yes, the answer is correct.
Score: 1
Accepted Answers:
Path length attenuation

5) Given two users U1 = {A, B, C, D} and U2 = {B, C, E, F}, what is their Jaccard similarity? ***1 point***

- 0.25
- 0.33
- 0.5
- 0.66

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.33

6) A graph has 8 nodes and 12 edges. What is its edge density? ***1 point***

- 0.375
- 0.428
- 0.5
- 0.6

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.428

7) What is the diameter of a binary tree with 7 nodes arranged in a balanced fashion? ***1 point***

- 2
- 3
- 4
- 5

Yes, the answer is correct.
Score: 1
Accepted Answers:
4

8) In a Twitter follower network, which centrality best represents a user followed by other popular users? ***1 point***

- Degree Centrality
- Eigenvector Centrality
- Closeness Centrality
- Betweenness Centrality

Yes, the answer is correct.
Score: 1
Accepted Answers:
Eigenvector Centrality

9) What is the clustering coefficient of a node connected to three others who are all mutually connected? ***1 point***

- 1
- 0.5
- 0.33
- 0

Yes, the answer is correct.
Score: 1
Accepted Answers:
1

10) A directed graph has 6 nodes. If the in-degree and out-degree of each node are 3, what is the total number of directed edges? ***1 point***

- 9
- 12
- 18
- 36

Yes, the answer is correct.
Score: 1
Accepted Answers:
18

SNA Week 3

Assignment submitted on 2025-08-08, 12:11 IST

1) Which of the following is a necessary condition for a network to exhibit the small-world property? *1 point*

- (•) Average path length grows logarithmically with network size
- ( ) Degree distribution follows a power law
- ( ) Clustering coefficient is zero
- ( ) Average path length grows linearly with network size

Yes, the answer is correct.
Score: 1
Accepted Answers:
Average path length grows logarithmically with network size

2) In an Erdos-Renyi network G(N, p), the probability that a given node has degree k is described by which distribution (for large N)? *1 point*

- (•) Poisson distribution
- ( ) Power-law distribution
- ( ) Exponential distribution
- ( ) Normal distribution

Yes, the answer is correct.
Score: 1
Accepted Answers:
Poisson distribution

3) In the Watts-Strogatz model, increasing the rewiring probability from 0 toward 1 primarily: *1 point*

- (•) Decreases average path length while initially preserving high clustering
- ( ) Increases clustering coefficient
- ( ) Makes the degree distribution follow a power law
- ( ) Guarantees emergence of a giant component at any N

Yes, the answer is correct.
Score: 1
Accepted Answers:
Decreases average path length while initially preserving high clustering

4) The preferential-attachment mechanism in the Barabasi-Albert model implies that: *1 point*

- (•) Nodes acquire links proportional to their current degree
- ( ) Nodes connect randomly with equal probability
- ( ) Nodes connect to those with the least degree
- ( ) New edges connect only existing nodes

Yes, the answer is correct.
Score: 1
Accepted Answers:
Nodes acquire links proportional to their current degree

5) For a random network, the critical average degree at which a giant component emerges is approximately: *1 point*

- ( ) 0.5
- (•) 1.0
- ( ) ln(N)
- ( ) N/2

Yes, the answer is correct.
Score: 1
Accepted Answers:
1.0

6) In an Erdos-Renyi graph G(N, p), the expected number of triangles (3-cycles) is: *1 point*

- (•) C(N, 3) * p^3
- ( ) C(N, 3) * p^2
- ( ) N * p^3
- ( ) N * p

Yes, the answer is correct.
Score: 1
Accepted Answers:
*C(N, 3) * p^3*

7) Which network model best reproduces the heavy-tailed degree distributions observed in many real-world networks? ***1 point***

- Erdos-Renyi model
- Watts-Strogatz model
- Barabasi-Albert model
- Configuration model with a Poisson degree sequence

Yes, the answer is correct.
Score: 1
Accepted Answers:
Barabasi-Albert model

8) In the configuration model, connectivity of the network is largely determined by which property of the degree sequence? ***1 point***

- Mean degree only
- Variance of degree
- Presence of degree-1 nodes
- Second moment of the degree distribution

Yes, the answer is correct.
Score: 1
Accepted Answers:
Second moment of the degree distribution

9) The assortativity coefficient of a social network measures the: ***1 point***

- Tendency of nodes to cluster into communities
- Correlation between the degrees of connected nodes
- Average shortest path length
- Likelihood of triadic closure

Yes, the answer is correct.
Score: 1
Accepted Answers:
Correlation between the degrees of connected nodes

10) For a scale-free network with degree exponent gamma between 2 and 3, which statement about robustness is generally true? ***1 point***

- Random node failures quickly fragment the network
- Targeted removal of high-degree hubs is less effective than random failures
- Random node failures leave the giant component largely intact
- The network has no hubs, so failures are uniform

Yes, the answer is correct.
Score: 1
Accepted Answers:
Random node failures leave the giant component largely intact

SNA Week 4

Assignment submitted on 2025-08-19, 12:47 IST

1) The node with the lowest out-degree is always the most prestigious node. ***1 point***

- ○ True
- ◉ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

For question 2 to 3 -

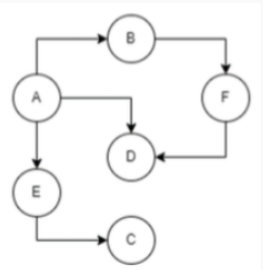


Fig 1: Network G1

2) If $p_e(x, y)$ represents the probability of formation of an edge between nodes x and y, then employing the property of Triadic closure, what can be hypothesised about the relation $p_e(A, F)$ vs $p_e(C, D)$ from the network in Fig. 1? ***1 point***

- ◉ $p_e(A, F) > p_e(C, D)$
- ○ $p_e(A, F) < p_e(C, D)$
- ○ $p_e(A, F) = p_e(C, D)$
- ○ $p_e(A, F) = 2*p_e(C, D)$

Yes, the answer is correct.
Score: 1
Accepted Answers:
$p_e(A, F) > p_e(C, D)$

3) What is the SimRank value between E and F in the network in Fig. 1? ***1 point***

- ○ 0.2
- ◉ 0.0
- ○ 0.4
- ○ 0.6

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.0

4) Given the formula of pagerank as $PG(v_i) = \frac{(1-\alpha)}{|V|} + \alpha \sum_{v_j \in In(v_i)} \frac{PG(v_j)}{outdeg(v_j)}$ what is α in this equation? *1 point*

- Transition probability
- Damping factor
- Total number of outdegrees in the network
- Total edges

Yes, the answer is correct.
Score: 1
Accepted Answers:
Damping factor

5) Consider the network in Fig. 2 of N = 5 nodes and the iterative PageRank formula. Determine the first iteration of ranks, assuming α = 0.8, R0 = [1/5, 1/5, 1/5, 1/5, 1/5] and E = [1/5, 1/5, 1/5, 1/5, 1/5] *1 point*

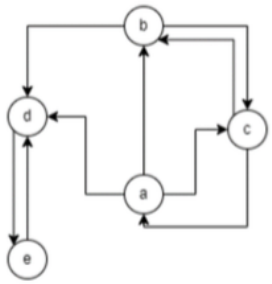


Fig 2: Network G2

- R1 = [0.28, 0.594, 0.594, 0.994, 0.3]
- R1 = [0.08, 0.394, 0.394, 0.794, 0.1]
- R1 = [0.18, 0.494, 0.494, 0.894, 0.2]
- R1 = [0.38, 0.694, 0.694, 0.994, 0.4]

No, the answer is incorrect.
Score: 0
Accepted Answers:
R1 = [0.18, 0.494, 0.494, 0.894, 0.2]

6) What are time-homogeneous random walks? *1 point*

- Random walks where the transition probabilities multiply constantly over time.
- Random walks where the transition probabilities decrease consistently over time
- Random walks where the transition probabilities increase consistently over time
- Random walks where the transition probabilities remain constant over time

Yes, the answer is correct.
Score: 1
Accepted Answers:
Random walks where the transition probabilities remain constant over time

7) Which of the following is not a property of PathSim? *1 point*

- Symmetric: s(x,y) = s(y,x)
- Normalised: s(x,y) ∈ [0,1]
- Triangle property: s(x,y) + s(y,z) = s(x,z)
- Self-maximised: s(x,x) = 1

Yes, the answer is correct.
Score: 1
Accepted Answers:
Triangle property: s(x,y) + s(y,z) = s(x,z)

For Question 8 to 10 -

Consider a restaurant review network containing objects of two types – restaurant (R) and user (U). There exists a review (V) relationship between U and R. Consider the adjacency matrix as shown in Table 1, where each cell shows the number of reviews given by a user to a restaurant. Answer the following questions:

	Michelle	Alice	Bob	Eve
Mint	2	4	0	0
Pavilion	4	0	2	1
Symposium	2	4	0	0
Sky Route	0	0	1	3

Table 1

8) PathSim between Mint and SkyRoute?

- 0.39
- 0.41
- 1.0
- 0.0

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.0

9) PathSim between Mint and Pavilion?

- 0.39
- 0.41
- 1.0
- 0.0

Yes, the answer is correct.
Score: 1
Accepted Answers:
0.39

10) Peer restaurant for Mint?

- Pavilion
- Symposium
- SkyRoute

Yes, the answer is correct.
Score: 1
Accepted Answers:
Symposium

SNA Week 5

Assignment submitted on 2025-08-27, 20:01 IST

1) If a network has disconnected components, it must have disjoint communities. ***1 point***

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False

2) Post the Syrian War, refugee groups have scattered across the globe. Assume only one refugee group to be present at a given location XYZ. A study has found that a refugee's face-to-face interaction with the natives of XYZ leads to negative sentiments, whereas a refugee's face-to-face interaction with other refugees leads to positive sentiments. State the class of community detection method that can be used in this case. ***1 point***

- Disjoint community detection
- Overlapping community detection
- Hierarchical community detection

Yes, the answer is correct.
Score: 1

Accepted Answers:
Disjoint community detection

3) What will be the diameter of a clique with n number of nodes? ***1 point***

- n-1
- n
- n/2
- 1.0

Yes, the answer is correct.
Score: 1

Accepted Answers:
1.0

For Question 4 to 6 -

Consider the network in Fig 1.

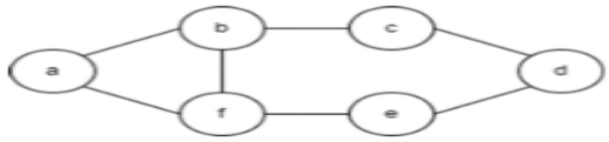


Fig 1

4) If {a,b,c,f,e} is a k-clique, what is the value of k?

- 1
- 2
- 3
- 4

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

5) Is {b,e,f} a k-clan?

- Yes
- No

Yes, the answer is correct.
Score: 1

Accepted Answers:
No

6) Which of the following is a 2-clan in the network?

- a,b,c,f,e}
- {a,b,c,d,f}
- {b,c,d,e,f}
- {a,f,b,c,d}

Yes, the answer is correct.
Score: 1

Accepted Answers:
{b,c,d,e,f}

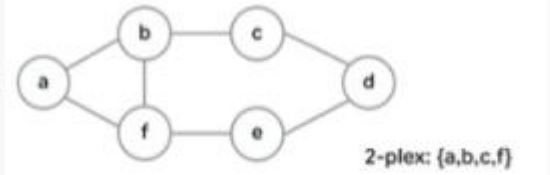
7) K-clan is also a k-clique and a k-club.

- True
- False

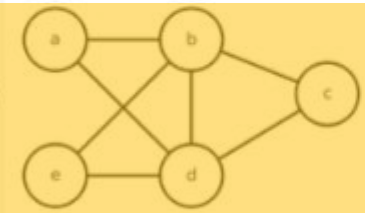
No, the answer is incorrect.
Score: 0

Accepted Answers:
True

8) Which of the following combinations is correct?



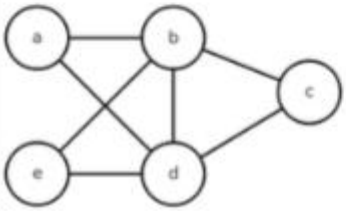
2-plex: {a,b,c,f}



2-plex: {a,b,e,d}

Yes, the answer is correct.
Score: 1

Accepted Answers:



2-plex: {a,b,e,d}

For Question 9 to 10 -

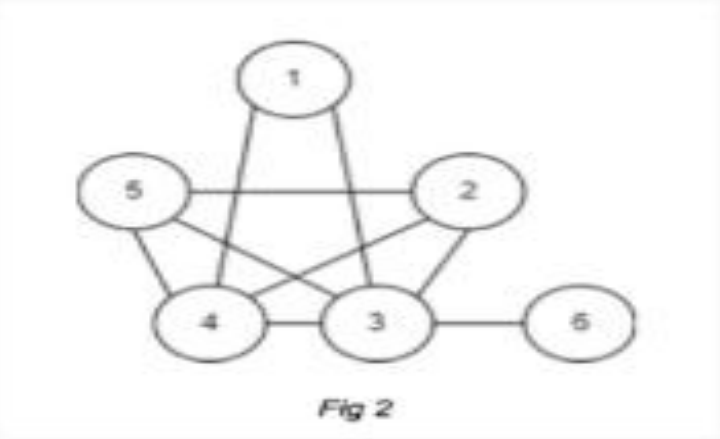
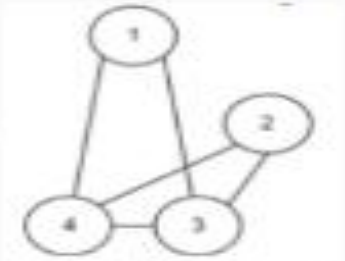
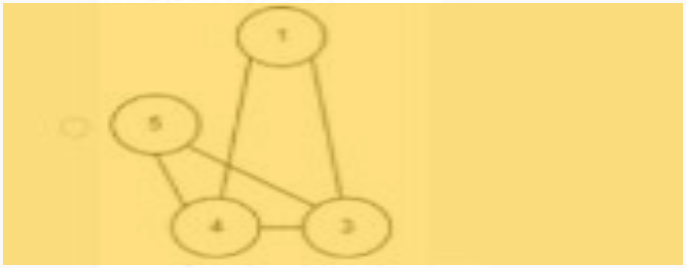
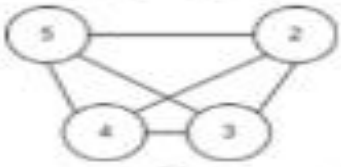


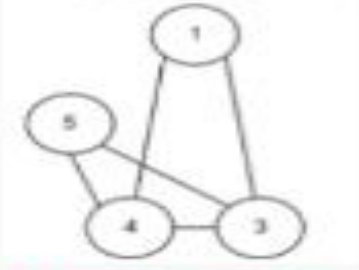
Fig 2

9) Given the network in Fig 2, which is a 2-core subgraph.



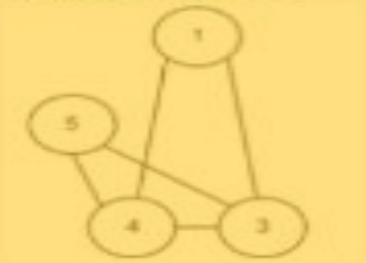




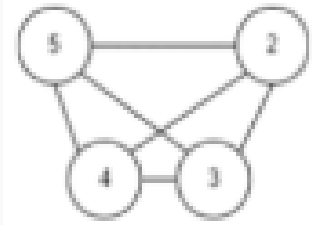


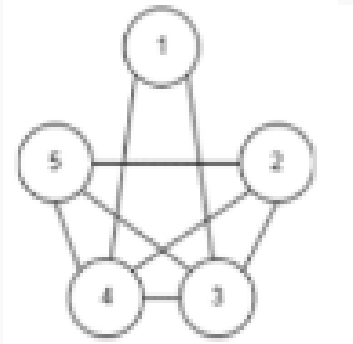
No, the answer is incorrect.
Score: 0

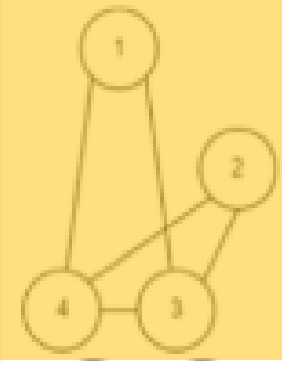
Accepted Answers:

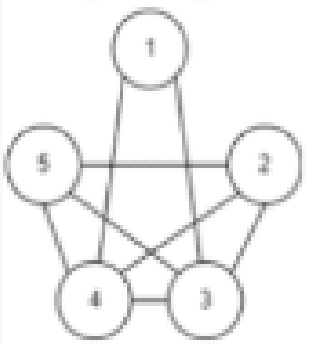


10) Given the network in Fig 2, which is a 3-core subgraph.



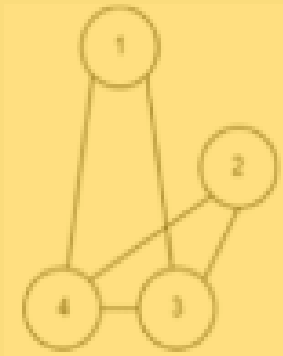






No, the answer is incorrect.
Score: 0

Accepted Answers:



SNA Week 6

Assignment submitted on 2025-09-03, 22:03 IST

1) The two steps in Louvain Community Detection are: **1 point**

- Community aggregation, community detection
- Modularity optimization, modularity resolution
- Modularity optimization, community aggregation
- Modularity resolution, community detection

Yes, the answer is correct.
Score: 1
Accepted Answers:
Modularity optimization, community aggregation

2) The value of modularity for unweighted and undirected networks lies in the range of: **1 point**

- [0,1]
- [0,1/2]
- [-1,1]
- [-1/2,1]

Yes, the answer is correct.
Score: 1
Accepted Answers:
[-1/2,1]

3) Which of the following are overlapping community detection algorithms (multiple choice) **1 point**

- Louvain
- BigClaim
- Clique percolation method
- Infomap

Yes, the answer is correct.
Score: 1
Accepted Answers:
BigClaim
Clique percolation method

4) For a network with N nodes, if each node is its own cluster, then the purity value so evaluated will be: **1 point**

- 0.5
- N
- N/2
- 1.0

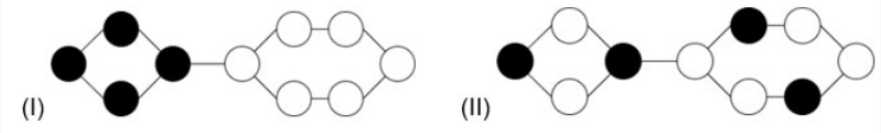
Yes, the answer is correct.
Score: 1
Accepted Answers:
1.0

5) Do we need ground truth labels for the Rand Index (RI) evaluation metric? **1 point**

- Yes
- No

No, the answer is incorrect.
Score: 0
Accepted Answers:
No

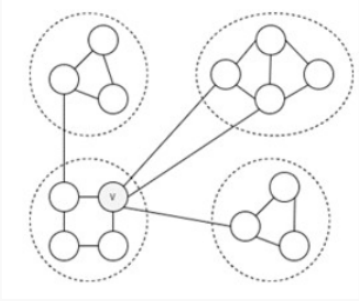
6) Given the following community assignments, which one will be preferred if modularity is to be considered as the deciding metric? **1 point**



- (I)
- (II)

Yes, the answer is correct.
Score: 1
Accepted Answers:
(I)

7) What is the permanence for the node v in the following network? **1 point**



- -0.2
- -0.4
- -0.6
- -0.8

No, the answer is incorrect.
Score: 0

Accepted Answers:
-0.8

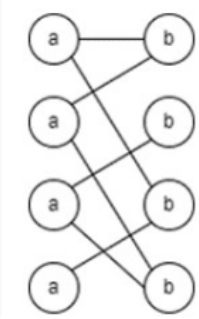
8) If a real-world network has small communities with well-connected intra edges and loosely connected inter edges, which metric will you prefer for detection of better communities? **1 point**

- Modularity
- Permanence

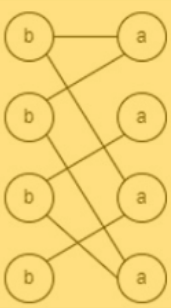
Yes, the answer is correct.
Score: 1

Accepted Answers:
Permanence

9) If we are given the labels at time step t and following asynchronous label propagation, what will be the assignment at time step t+1? **1 point**



Accepted Answers:



Direct Answer

10) For a real-world network with billions of nodes, community detection is easier than community search. **1 point**

- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

SNA Week 7

Assignment submitted on 2025-09-10, 11:47 IST

1) Link prediction can only predict missing links in a graph's current state and cannot forecast future links. **1 point**

- True
- False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

2) In dynamic networks, the link prediction problem must account for the addition of new nodes. **1 point**

- True
- False

Yes, the answer is correct.
Score: 1
Accepted Answers:
True

3) What is the range of Mutual information (MI)? **1 point**

- -1 <= MI <= 1
- 0 <= MI <= 1
- MI >= 0
- MI >= 1

Yes, the answer is correct.
Score: 1
Accepted Answers:
MI >= 0

4) In a dendrogram, what does a smaller height of the link between groups indicate? **1 point**

- Less similarity between the groups
- More similarity between the groups
- No relationship between height and similarity

Yes, the answer is correct.
Score: 1
Accepted Answers:
More similarity between the groups

5) What does the Katz similarity score measure? **1 point**

- Only direct connections between nodes
- Influence of nodes through only one-hop neighbors
- Influence of nodes through all paths, including beyond one hop
- Random similarity between nodes

Yes, the answer is correct.
Score: 1
Accepted Answers:
Influence of nodes through all paths, including beyond one hop

6) Which metric measures the number of actual negative links correctly predicted as negative by the model? **1 point**

- Precision
- Accuracy
- Area Under Curve
- True Negative Rate

Yes, the answer is correct.
Score: 1
Accepted Answers:
True Negative Rate

7) In the link prediction problem, how does the number of nodes in the graph typically change? ***1 point***

- (•) Remains the same
- ( ) Increases
- ( ) Decreases
- ( ) Changes randomly

Yes, the answer is correct.
Score: 1
Accepted Answers:
Remains the same

8) Jaccard Similarity is a type of: ***1 point***

- (•) Local similarity metric
- ( ) Global similarity metric
- ( ) Theoretical model
- ( ) Probabilistic model

Yes, the answer is correct.
Score: 1
Accepted Answers:
Local similarity metric

9) In a social network graph, node A has a degree of 4 and node B has a degree of 5. According to the preferential attachment score, what is the likelihood score for a future link between node A and node B? ***1 point***

- ( ) 9
- (•) 20
- ( ) 1.25
- ( ) 0.8

Yes, the answer is correct.
Score: 1
Accepted Answers:
20

10) If nodes X and Y are connected, and Y is also connected to Z, it is likely that X and Z will form a link. This idea is based on which link prediction principle? ***1 point***

- ( ) Jaccard Similarity
- ( ) Katz Index
- ( ) Preferential Attachment
- (•) Common Neighborhood

Yes, the answer is correct.
Score: 1
Accepted Answers:
Common Neighborhood

SNA Week 8

Assignment submitted on 2025-09-17, 19:53 IST

1) In the k-core of a graph, which of the following statements about the vertices is true? *1 point*

- Every vertex has exactly k edges (degree = k).
- Every vertex has at least k edges (degree ≥ k).
- Every vertex has at most k edges (degree ≤ k).
- Every vertex has no edges.

Yes, the answer is correct.
Score: 1

Accepted Answers:
Every vertex has at least k edges (degree ≥ k).

2) Suppose you want to model the spread of a novel COVID-19 variant using an epidemic cascade model. Given that individuals remain susceptible to reinfection after recovery, which epidemic model best captures this behavior. *1 point*

- SIS
- SIR
- SEIR
- None of the above

Yes, the answer is correct.
Score: 1

Accepted Answers:
SIS

3) What does SIR stand for in epidemic modeling? *1 point*

- Susceptible - Infected - Resistant
- Susceptible - Infected - Recovered
- Susceptible - Infectious - Removed
- Sick - Immune - Recovered

Yes, the answer is correct.
Score: 1

Accepted Answers:
Susceptible - Infected - Recovered

4) In an information cascade model, what is the term used for the final set of nodes that are affected or influenced? *1 point*

- Contagion
- Susceptibles
- Activators
- Adopters

Yes, the answer is correct.
Score: 1

Accepted Answers:
Adopters

5) The final propagation tree obtained by the spread of the infection is known as a contagion. *1 point*

- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

6) In decision-based cascade models, a node's decision tries to optimize the reward for its local community. *1 point*

- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
True

7) The rate of change of infected population in the SIS model depends solely on the birth rate of the virus. *1 point*

- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

8) In the SIS model, a recovered node cannot be infected again. *1 point*

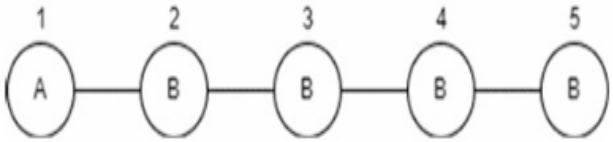
- True
- False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

For Question 9 to 10 -

Given the following graph G1, the first node is a hard-wired adopter of A, while all others have adopted B. The payoffs for adopting A and B are a and b, respectively. Further, the cost of adopting AB (irrespective of neighborhood) is c. Between two interacting nodes, we consider the following scenarios of payoff as shown in table T1. Using the interaction system starting from node 1, determine the strategies adopted by nodes 2 and 3 after the first iteration when a = 5, b = 2, c = 1.



Graph G1: Infinite chain network

	A	B	AB
A	a	0	a
B	0	b	b
AB	a	b	max(a,b)

Table T1: Payoff distribution

9) For Node 2: *1 point*

- A
- B
- AB

Yes, the answer is correct.
Score: 1

Accepted Answers:
AB

10) For Node 3: *1 point*

- A
- B
- AB

Yes, the answer is correct.
Score: 1

Accepted Answers:
AB

SNA Week 9

Assignment submitted on 2025-09-20, 12:06 IST

1) Egonet is defined as a subnetwork. *1 point*

- induced by its 1-hop neighbors
- induced by its 1-hop neighbors and itself
- induced by its 2-hop neighbors and itself
- where every pair of vertices are adjacent to each other

Yes, the answer is correct.
Score: 1
Accepted Answers:
induced by its 1-hop neighbors and itself

2) Common Neighbours and Adamic-Adar are techniques used in which category of network anomaly detection? *1 point*

- Community-based approach
- Structure-based approach
- Window-based approach
- Proximity-based approach

Yes, the answer is correct.
Score: 1
Accepted Answers:
Proximity-based approach

3) In window-based methods, what is the term for the number of elements skipped between the starting points of two consecutive windows? *1 point*

- belongingness
- lambda distance
- error-correcting matching distance
- hop length

Yes, the answer is correct.
Score: 1
Accepted Answers:
hop length

4) Which of the following is not a network-based global feature? *1 point*

- Closeness
- Average node degree
- Number of connected components
- MST weight

Yes, the answer is correct.
Score: 1
Accepted Answers:
Closeness

5) Which of the following is not a node-level feature? *1 point*

- Eigenvector
- Betweenness
- Modularity
- Degree assortativity

Yes, the answer is correct.
Score: 1
Accepted Answers:
Modularity

6) Which of the following is not a generic feature-based approach? *1 point*

- Graph edit distance
- Singular vector decomposition
- Error-correcting network matching distance
- Lambda-distance

No, the answer is incorrect.
Score: 0
Accepted Answers:
Singular vector decomposition

7) Outlier detection is not different from network-based anomaly detection. *1 point*

- True
- False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

8) In a dynamic network, both nodes and edges can change over time. *1 point*

- True
- False

Yes, the answer is correct.
Score: 1
Accepted Answers:
True

For Question 9 to 10 -

Consider a SNA class where you're analyzing communication patterns among students and the instructor using the ODDBALL algorithm to detect anomalies in the interaction network.

9) In Classroom A, all students communicate far more with the instructor than with each other. What kind of anomaly is most likely to help identify the instructor in this scenario? *1 point*

- Near Cliques
- Near Stars
- Heavy Vicinities
- Dominant Heavy Links

Yes, the answer is correct.
Score: 1
Accepted Answers:
Near Stars

10) In Classroom B, students communicate frequently with each other as well as with the instructor. What kind of anomaly would most likely characterize this network? *1 point*

- Near Cliques
- Near Stars
- Heavy Vicinities
- Dominant Heavy Links

Yes, the answer is correct.
Score: 1
Accepted Answers:
Near Cliques

SNA Week 10

Assignment submitted on 2025-09-29, 20:11 IST

1) A complete graph embedding generally makes sense if we have more than one graph to embed. **1 point**

- ○ True
- ◉ False

No, the answer is incorrect.
Score: 0

Accepted Answers:
True

2) The number of features in a machine learning model is always larger than the raw dataset. **1 point**

- ○ True
- ◉ False

Yes, the answer is correct.
Score: 1

Accepted Answers:
False

3) In graph representation learning, node embeddings are learned such that nodes with similar structural roles or attributes are mapped to similar vectors in the embedding space. **1 point**

- ◉ True
- ○ False

Yes, the answer is correct.
Score: 1

Accepted Answers:
True

4) Let G(V,E) be a graph where V represents the set of vertices and E represents the set of edges. If there is a mapping function defined as $f : u \rightarrow R^d$, where u is an element of V, what is this mapping function called? **1 point**

- ○ Random walk
- ○ Edge embedding
- ○ Graph embedding
- ◉ Node embedding

Yes, the answer is correct.
Score: 1

Accepted Answers:
Node embedding

5) Which of the following is not a homogenous network? **1 point**

- ○ Protein-protein interaction network
- ◉ Actor-Movie network
- ○ Citation network
- ○ Social media user network

Yes, the answer is correct.
Score: 1

Accepted Answers:
Actor-Movie network

6) What factor primarily determines the size of the adjacency matrix for a graph? **1 point**

- ◉ Number of nodes
- ○ Number of edges
- ○ Types of nodes
- ○ Weight on edges

Yes, the answer is correct.
Score: 1

Accepted Answers:
Number of nodes

7) What is the fundamental idea behind matrix factorization? *1 point*

- Increases the dimensionality of data
- Data visualization
- Structure-preserving dimensionality reduction
- None of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Structure-preserving dimensionality reduction

8) What do the matrices U and V represent in the Singular Value Decomposition (SVD) of a matrix $A=USV^T$? *1 point*

- U contains the right singular vectors, and V contains the left singular vectors.
- Both U and V contain the same singular vectors.
- U and V represent the original matrix A directly.
- U contains the left singular vectors, and V contains the right singular vectors.

Yes, the answer is correct.
Score: 1
Accepted Answers:
U contains the left singular vectors, and V contains the right singular vectors.

9) Which algorithm is used by Word2Vec to learn word embeddings? *1 point*

- K-means clustering
- Skip-gram
- Support Vector Machines
- None of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Skip-gram

10) Match the following graph representation of learning algorithms to their main methods.

GRL Algorithm	Method
1. DeepWalk	A. Matrix Factorization
2. GraRep	B. Random Walk
3. Graph Convolution Network	C. Neural Network

- 1-A, 2-C, 3-B
- 1-B, 2-C, 3-A
- 1-B, 2-A, 3-C
- 1-C, 2-B, 3-A

Yes, the answer is correct.
Score: 1
Accepted Answers:
1-B, 2-A, 3-C

SNA Week 11

Assignment submitted on 2025-10-04, 19:32 IST

1) In the LINE method, which network neighborhoods are captured by the second-order proximities? **1 point**

- Local
- Global

Yes, the answer is correct.
Score: 1
Accepted Answers:
Global

2) In the LINE method, which network neighborhoods are captured by the first-order proximities? **1 point**

- Local
- Global

Yes, the answer is correct.
Score: 1
Accepted Answers:
Local

3) In the context of R-GCN, distinct weight matrices are learned for which of the following? **1 point**

- Communities
- Rankings
- Relations
- Cliques

Yes, the answer is correct.
Score: 1
Accepted Answers:
Relations

4) What are the characteristics of the random walks generated in the DeepWalk algorithm? **1 point**

- Conditioned on some probability
- Uniform
- Variable length
- All of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Uniform

5) Which types of information networks is the "LINE" network embedding method suitable for? **1 point**

- Undirected only
- Directed only
- Weighted only
- All of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
All of the above

6) In a graph convolutional network with a depth of L, when applied to a graph G(V,E), how many learnable weight matrices are required? **1 point**

- |V|
- L
- |E|*L
- L*L

Yes, the answer is correct.
Score: 1
Accepted Answers:
L

7) In the context of vector spaces, a set B of vectors in a vector space V is called a basis of V if: ***1 point***

- The vectors in B are all unit vectors
- The vectors in B are mutually orthogonal
- Every vector in V can be written as a unique linear combination of the vectors in B
- The set B contains all vectors in V

Yes, the answer is correct.
Score: 1
Accepted Answers:
Every vector in V can be written as a unique linear combination of the vectors in B

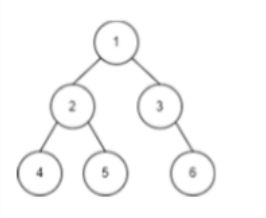
8) Using which of the following approaches GraphSAGE develops representations for dynamic graphs? ***1 point***

- Inductive learning
- Reinforcement learning
- Supervised classification
- None of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Inductive learning

For Question 9 to 10 -

Consider the following graph, with nodes 1-6, and based on this graph, answer the questions below.



9) Identify the depth-first search walk. ***1 point***

- {1,2,3,4,5,6}
- {1,3,6,2,4.5}
- {1,2,5,3,6,4}
- {1,2,4,5,3,6}

Yes, the answer is correct.
Score: 1
Accepted Answers:
{1,2,4,5,3,6}

10) Identify the breadth-first search walk. ***1 point***

- {1,2,3,4,5,6}
- {1,3,6,2,4.5}
- {1,2,5,3,6,4}
- {1,2,4,5,3,6}

Yes, the answer is correct.
Score: 1
Accepted Answers:
{1,2,3,4,5,6}

SNA Week 12

1) Collusive users usually have a longer inter-support time than genuine users. **1 point**

- ○ True
- ◉ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

2) Sockpuppets tend to have higher PageRank than ordinary nodes. **1 point**

- ○ True
- ◉ False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

3) Considering that the friendship network on Facebook is two-way, we can model it as a directed network. **1 point**

- ○ True
- ◉ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

4) In the SIR model, a recovered node can be infected again. **1 point**

- ○ True
- ◉ False

Yes, the answer is correct.
Score: 1
Accepted Answers:
False

5) Which of the following is the common behavior of sockpuppet accounts? **1 point**

- ◉ Making similar edits
- ○ Posting only bad comments
- ○ Posting at different time
- ○ None of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Making similar edits

6) The primary post made on Reddit is termed as: **1 point**

- ○ Sockpuppet
- ◉ Root post
- ○ Comment
- ○ Response post

Yes, the answer is correct.
Score: 1
Accepted Answers:
Root post

7) Define token with respect to natural language processing. ***1 point***

- Grammatical structure that conveys the overall meaning of a text.
- Type of machine learning algorithm used for text classification.
- Smallest possible unit of a sentence.
- None of the above

Yes, the answer is correct.
Score: 1
Accepted Answers:
Smallest possible unit of a sentence.

8) In the context of CoreRank, a support network is typically: ***1 point***

- Directed and bipartite
- Undirected and weighted
- Fully connected
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Directed and bipartite

9) On YouTube, users can watch, like, or comment on videos. If we build a network where users and videos are both nodes, and edges show their interactions, what type of network best captures this: ***1 point***

- Homogeneous network with undirected edges
- Homogeneous network with directed edges
- Bipartite network with user-to-user connections
- Heterogeneous network with multiple types of nodes and edges

Yes, the answer is correct.
Score: 1
Accepted Answers:
Heterogeneous network with multiple types of nodes and edges

10) Which of the following describes a blackmarket freemium service used to boost engagement on social media? ***1 point***

- Receiving upvotes/retweets in return for money
- Barter appraisals with each other
- Giving money so that you can reshare some content
- All of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Barter appraisals with each other

----------X----------